

ECS
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90-98

KANSAS GEOLOGICAL SURVEY Analytical Services Section

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A REFERENCE BEAM ATTENUATOR FOR THE TECHNICON UV-VIS SPECTROPHOTOMETER

The Technicon UV-Vis spectrophotometric detector unit uses a chopped beam which is alternately passed through the sample and reference flowcell compartments. The beam is focused near the center of the cell compartment. Thus, the rounded ends of the flowcell and the 1/8" diameter of the glass tubing comprising the flowcell create a situation in which the light throughput in the empty reference compartment is much greater than that of the sample compartment containing a mounted flowcell. This imbalance of the sample and reference signals is overcome electronically in normal operation by use of the balance and baseline controls. However, in analyses making use of the 50 mm flowcell or having highly colored flowstreams the baseline and balance controls are often adjusted to a point which is near an extreme of their operational range.

With both the sample and reference flowcell compartments empty, the recorder pen is at about 0.0 when the baseline control is set to its mid-range and the balance control is turned back 2-1/2 turns from its maximum. The baseline control is a 10-turn pot covering a 0.6 Abs range, and the balance control is a 10-turn pot covering the range of -0.5 to +1.5 Abs.

A mechanical attenuator located near the exit window in the reference flowcell compartment makes it possible to achieve a balance of light intensity between the sample and reference beams with the balance and baseline controls set at more optimal conditions. The attenuator consists of a narrow, thin metal sheet which is attached perpendicularly to the end of a long thin metal rod. The kinematic flowcell mount is removed from the face plate of the reference cell compartment and the threaded hole is plugged with a short bolt from the front side. From the backside of the face plate, the rod of the attenuator is passed through the

left-most port. Then the other two ports of the faceplate are plugged to prevent light leakage. The rod may now be used to move the attenuator into or out of the reference light beam, or rotate the attenuator up and out of the light beam. The attenuator has been spray-coated with flat black paint to reduce reflection and stray light problems. As such, the attenuator offers ease of operation in balancing the light beams as compared to the use of an empty flowcell on the x-y-z kinematic mount of the reference compartment and is superior to an electronic balance achieved with an empty reference compartment.

For operation, assemble the Technicon AutoAnalyzer II system for the desired chemistry. Set the Baseline Knob at its mid-range position, 5 turns from the top or bottom. Next, turn the Balance Knob fully counterclockwise and then back clockwise for 2-1/2 turns in order to reach the 0.0 Abs electronic setting with a ± 0.3 Abs baseline control range. When a normal flowstream is achieved, move the attenuator in order to reposition the recorder pen to near 0.0. Fine adjustments of the baseline are then made with the Baseline Knob. In changing from one chemistry to another the Baseline Knob is set back to its mid-range position and the attenuator is adjusted to bring the recorder pen to a near 0.0 scale reading. The Baseline Knob is then used for final baseline adjustment.

Figure 1 provides the configuration and dimensions for the attenuator. Figure 2 presents frontal and rear views of the reference flowcell compartment face plate with the mechanical attenuator in place.

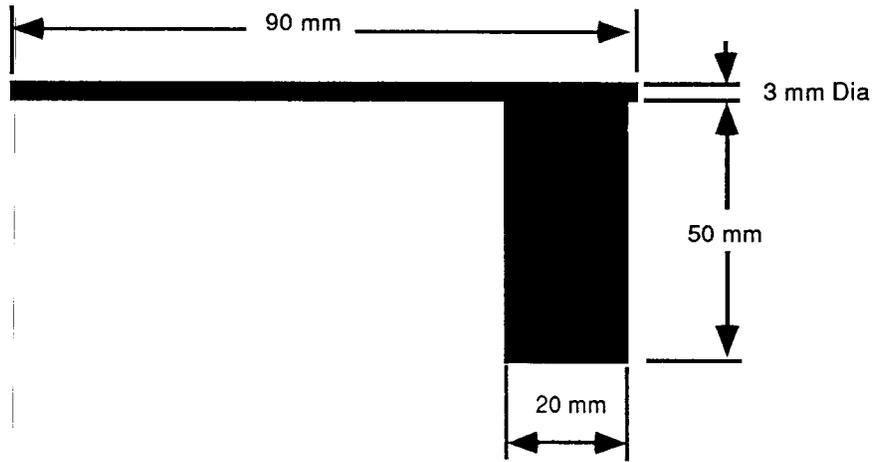
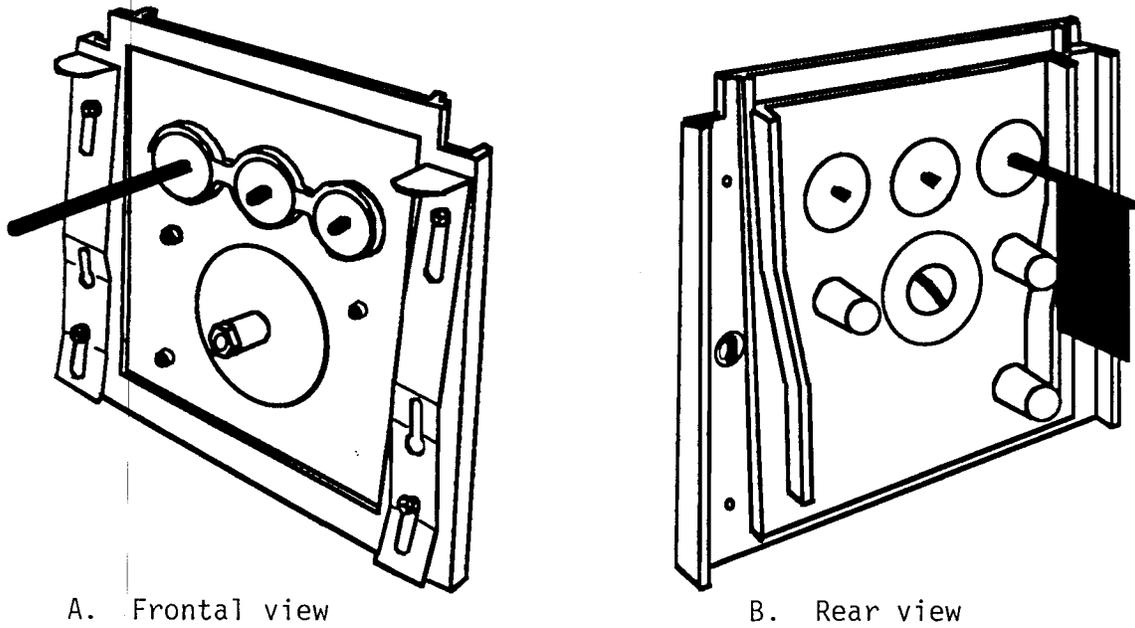


Figure 1. Configuration and dimensions of the mechanical attenuator



A. Frontal view

B. Rear view

Figure 2. Reference flowcell compartment face plate with mechanical attenuator in place